

US EPA ARCHIVE DOCUMENT

# 2011 General Motors Diesel Emissions Update



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# Duramax Diesel

## *Duramax Diesel (LML)*



- Proven durability and reliability
  - Over 1.3 million sold since 2000 introduction
  - Allison transmission
  - 5 year/100,000 mile Powertrain warranty
- Improved Acceleration
  - Anticipated “Best-in-Class”
  - Faster at higher payloads than current diesel
- Improved Noise/Vibration/Harshness (NVH)
  - High load/high speed noise reduced 35%
  - Continued NVH leader
- Improved Fuel Economy by **11%** from 2010
- B20 Bio-diesel capability

# Vehicle Range

## ***“Best-in-Class” Diesel Fuel Economy***

- SCR NOx reduction system optimized for fuel economy
- Diesel Particulate Filter regen cycle lengthened by 75%
  - New calibrations reduce soot in DPF
  - Up to 700 miles between regens
- Lower idle speed
- Vehicle aerodynamic improvements
- Electronic fan clutch and Allison trans improvements

## ***Larger Fuel Tanks***

- |                |         |          |          |
|----------------|---------|----------|----------|
| • Pickups      | Single: | 36.0 Gal |          |
| • Chassis cabs | Front:  | 23.5 Gal | RPO: N2M |
|                | Dual:   | 63.5 Gal | RPO: N2N |

# New Diesel Emissions

# 2010 CY Diesel Emissions

## ***1/1/10 – New diesel emissions laws take effect***

- Significantly reduce the amount of NOx allowed
- GM solution is Selective Catalytic Reduction (SCR)  
aka: Urea or DEF injection
- Utilizes Diesel Exhaust Fluid (DEF)
  - 67.5% Purified water
  - 32.5% Automotive grade Urea
  - Produced primarily from natural gas
  - Widely used in Europe where it is known as AdBlue

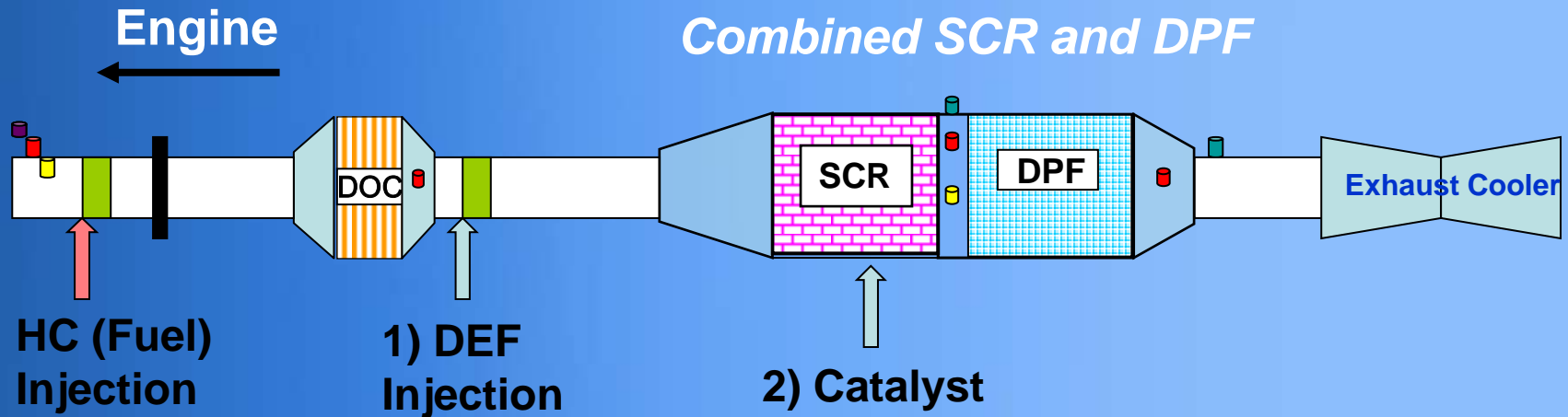
# 2010 CY Diesel Emissions

## ***1/1/10 – New diesel emissions laws take effect***

- No major redesign of engine required
  - No additional cooling or heat rejection
- Requires packaging of new components:
  - DEF Tank & Fill
  - DEF injector
  - SCR Catalyst
  - Electronic Controls



# Duramax 6.6L Exhaust Concept



1. Small amounts of Diesel Exhaust Fluid (DEF) is injected into the exhaust stream, heat turns into ammonia
2. Ammonia reacts with a catalyst converting NOx to Nitrogen and Water Vapor



# **Diesel Exhaust Fluid in truck operation**

***DEF freezes at approximately 12° F***

- Thaws with no degradation
- DEF tank & lines are heated for cold weather operation
- No impact on cold weather engine operation

***DEF has at least a 1 year shelf life***

- DEF will degrade at temperatures above 86° F or in direct sunlight for an extended period
- Not an issue if DEF stock is rotated within a year
- DEF containers will have date stamp

***On-board warning systems advise driver when DEF level is low or inferior quality***

# How much DEF will be used?

***Anticipated DEF usage of 1 – 1.25% of diesel fuel usage***

***Vehicle range before requiring DEF tank refill:***

- Can vary significantly based on drive cycle
- Usage related to diesel consumption
- Heavy loads, off-road/mountain driving, etc will reduce fuel economy and increase DEF usage

# Diesel Exhaust Fluid Availability

***Through all dealers that sell diesel engine trucks***

– Plus truck stops and independent suppliers

***GM will provide DEF in:***

- 1 gallon plastic
- 2.5 gallon plastic
- 55 gallon drum
- 330 gallon tote



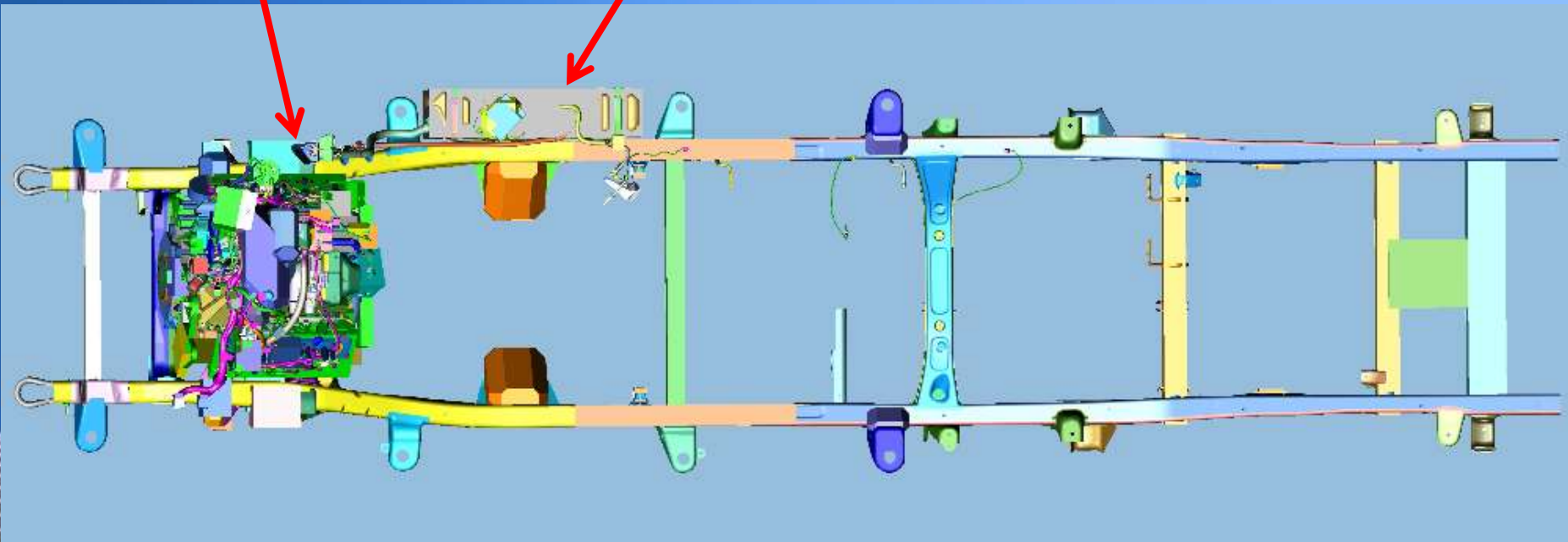
***DEF pricing***

- Estimates around \$2.00 - \$4.00 per gallon

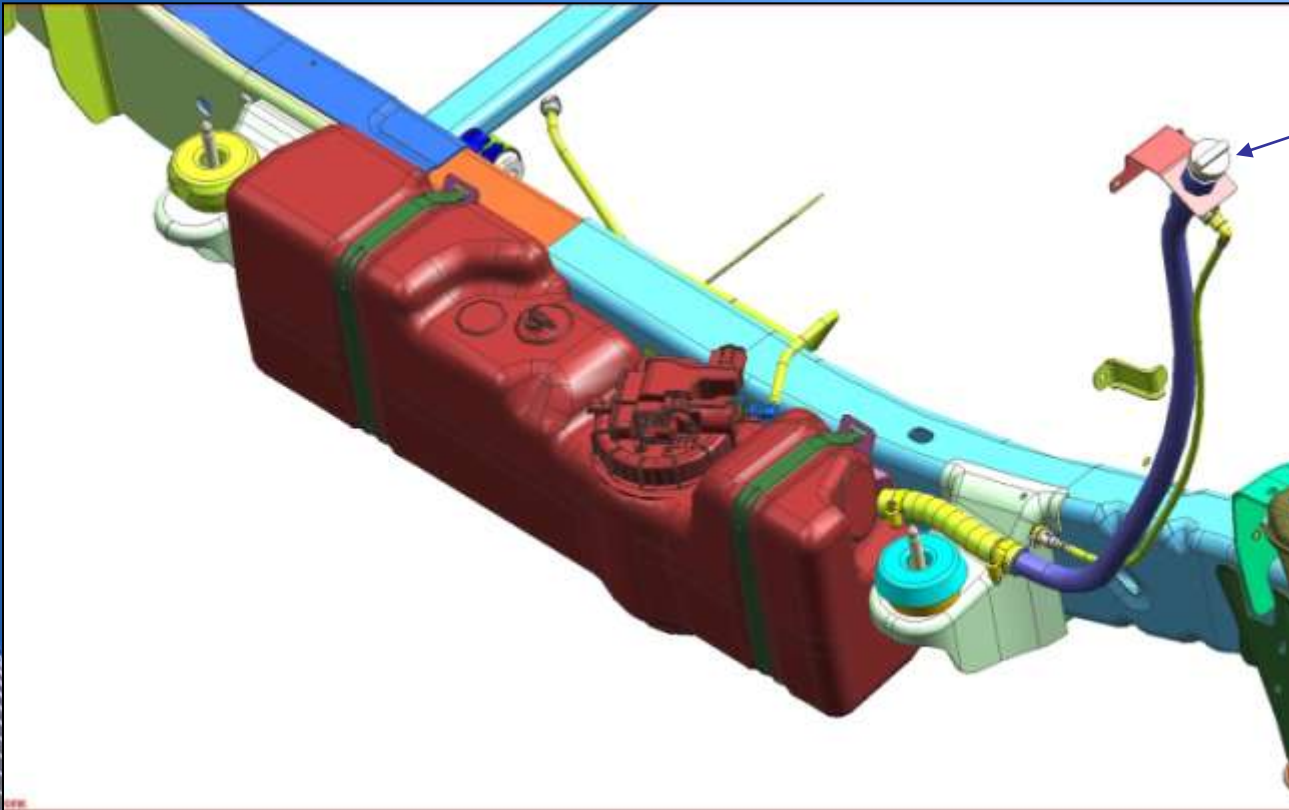
# Silverado/Sierra DEF System

5.5 gal DEF Tank (passenger side)

DEF Fill (underhood)



# Silverado/Sierra DEF System



**DEF Tank Fill Neck  
Location:**

**Under hood on Right  
Side of Engine  
Compartment back  
near Front of Dash /  
Close to rear edge of  
Hood.**

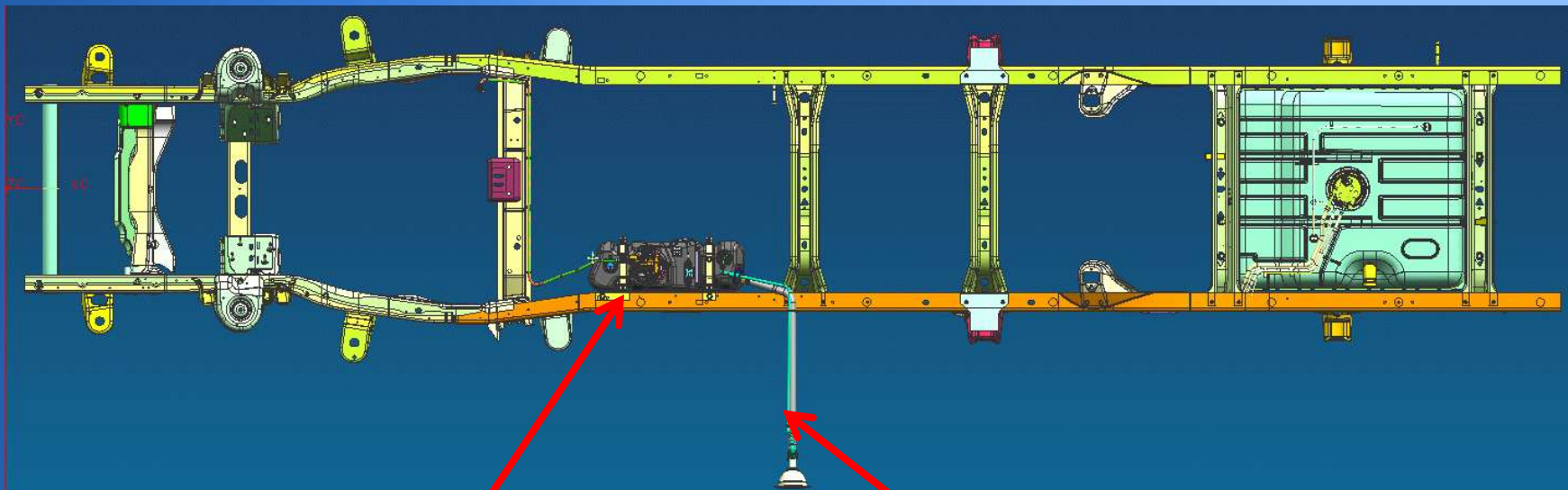


# Silverado/Sierra Underhood DEF Fill



DEF Fill

# G-Cutaway DEF Tank w/Rear Fuel Tank



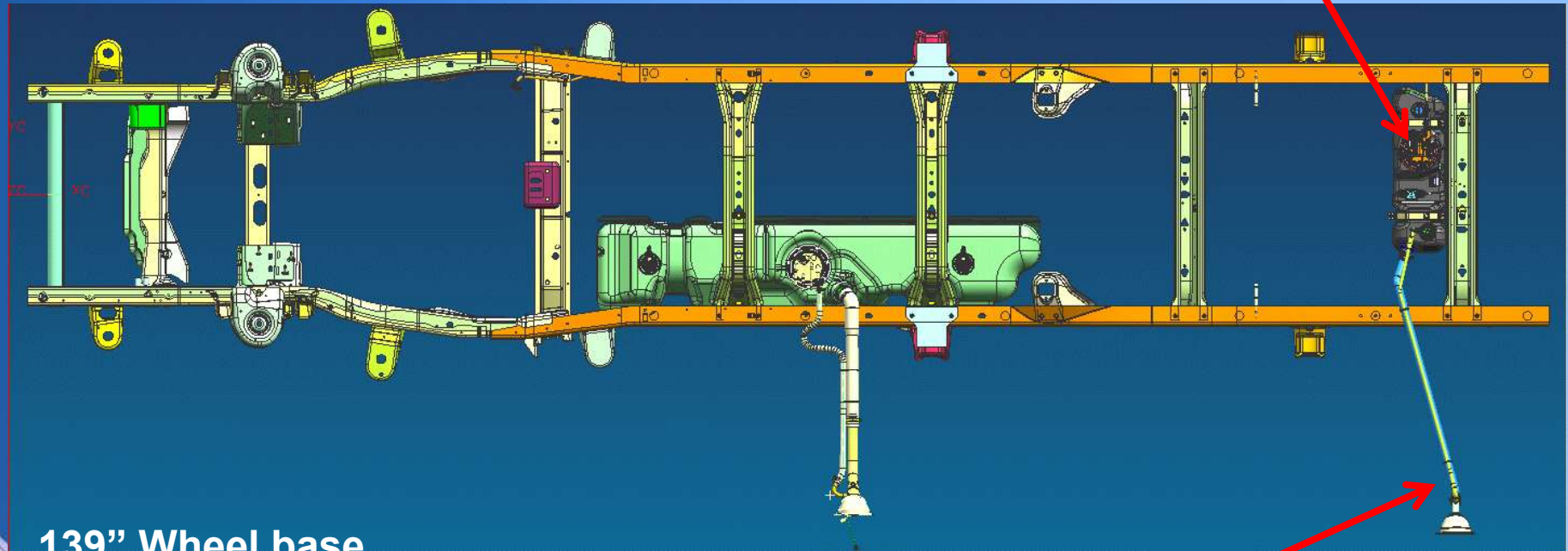
**DEF Tank 5.83 Gallons**

**DEF Tank Flexible Fill Hose**



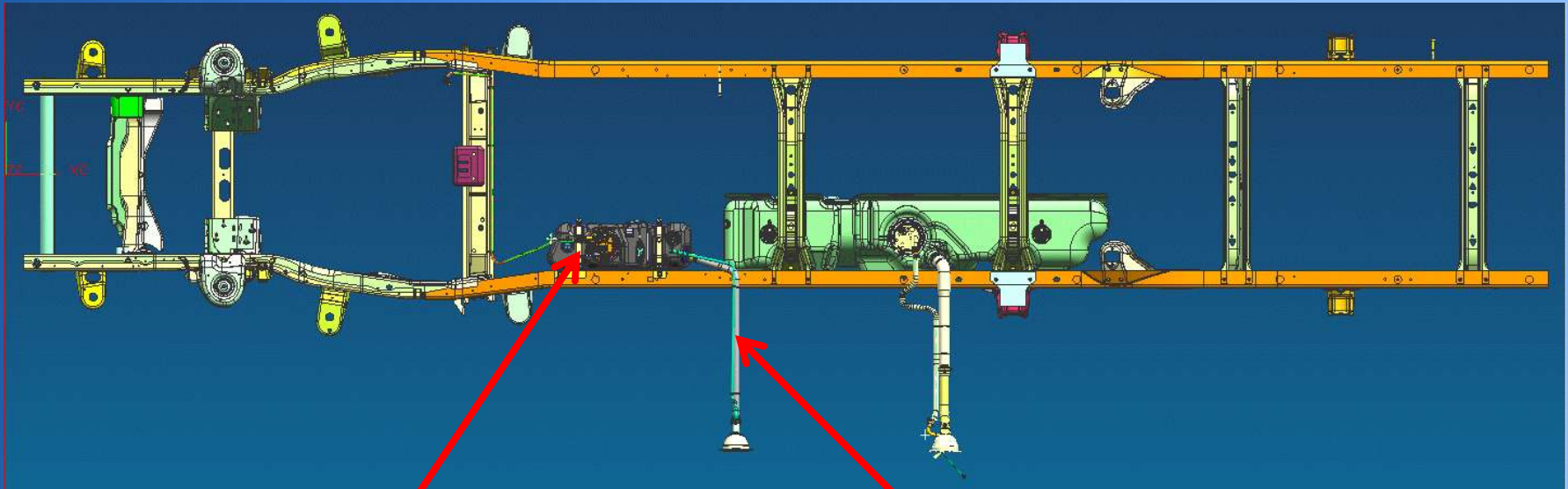
# G-Cutaway DEF Tank w/Side Fuel Tank

DEF Tank 5.83 Gallons



DEF Tank Flexible Fill Hose

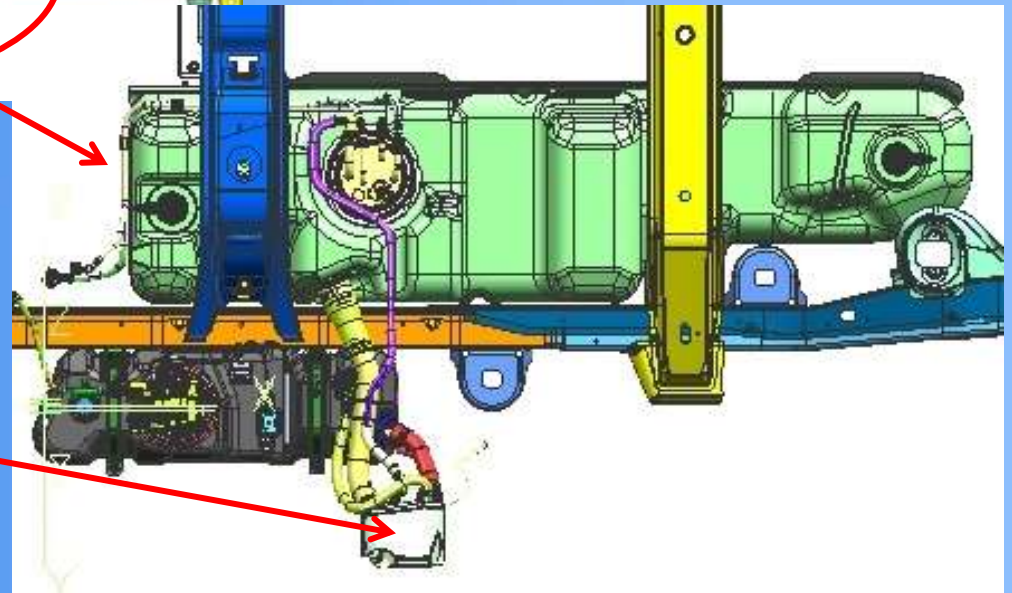
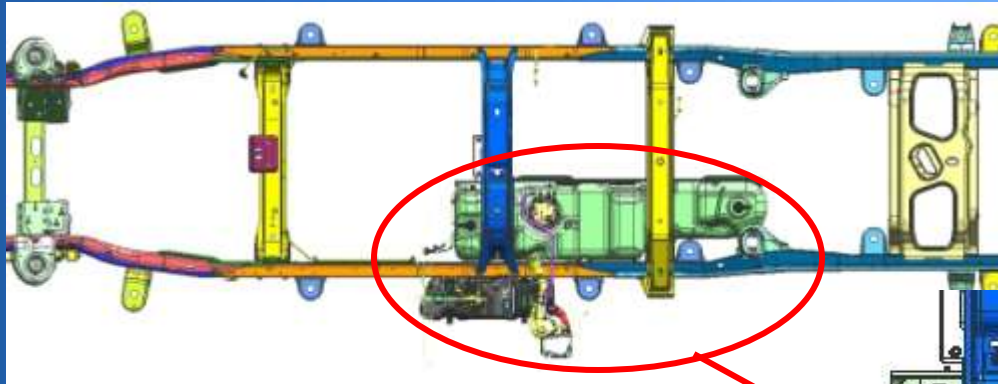
# G-Cutaway DEF Tank w/Side Fuel Tank



**DEF Tank 5.83 Gallons**

**DEF Tank Flexible Fill Hose**

# G-Van(Cargo) DEF Tank & Fuel Tank Location



**DEF Fill on Vans located adjacent to Fuel Fill**

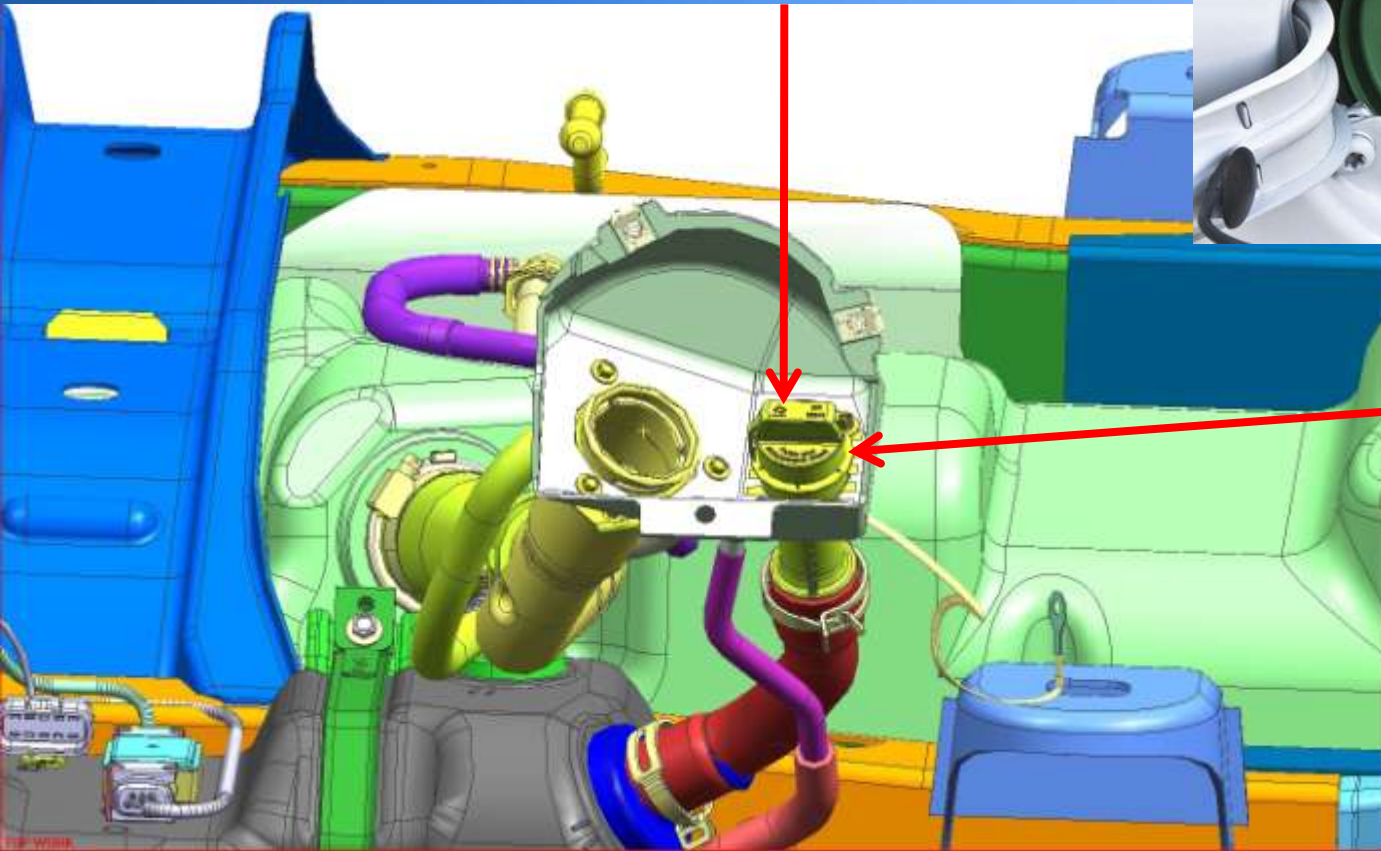


# G-Van(Cargo) DEF Tank & Fuel Tank Fills

Smaller 19 mm opening  
– cannot add diesel



DEF Fill Cap is  
always blue



# EPA mandates emission compliance



## ***EPA Requires:***

- Tamper resistant design
- DEF level and quality enforcement
- Freeze protection
- Driver warning system using this symbol



## ***Driver inducement strategy to replenish DEF***

1. Warning light and chimes
2. Speed limitation 55 mph
3. Speed limitation 4 mph

## ***Similar strategies for DEF quality and tampering warnings***



# Upfitter Modifications

***No modifications recommended - DEF system is integral to emissions compliance:***

- **DEF lines and hoses:**
  - Lines to exhaust system should not be moved, they are heated
  - DEF tank fill hose is flexible to modify position on cutaway chassis; height of fill to be retained to maintain DEF capacity
- **Exhaust system:**
  - Exhaust routing modification allowed after DPF within guidelines published by [gmupfitter.com](http://gmupfitter.com)

# Thank You